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Glenn Safety Manual

Hazardous Operations w/Change 2 (9/30/2015)

Approved by: QS/Chief, Safety and Health Division

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Change Record

Rev.	Effective Date	Expiration Date	GRC25, Change Request #	Description
A	8/22/2012	8/22/2017	130	Bi-annual review/revision
Change 1	4/16/2014	8/22/2017	N/A	Administrative change to add front cover and change history log to comply with NPR 1400.1 and added "The GRC shall follow the requirements of" in Section 6.0
Change 2	9/30/2015	8/22/2017	N/A	Administrative change to remove hyperlinks.

***Include all information for each revision. Do not remove old revision data. Add new rows to table when space runs out by pressing the tab key in the last row, far right column.*

Contents

Chapter 10—Hazardous Operations

NOTE: *The current version of this chapter is maintained and approved by the Safety and Health Division (SHeD). The date of this chapter is August 2012. The current version is located on the Glenn Research Center intranet within the BMS Library. Approved by Chief of Safety and Health Division.*

1.0 PURPOSE

The purpose of the Hazardous Operations (HazOps) program is to protect employees who may engage in HazOps involving materials or equipment that, if misused or mishandled, have a high potential to result in loss of life, serious injury or illness to personnel, or damage to systems, equipment, or facilities. NASA Glenn Research Center (GRC) believes that adequate preparation and strict adherence to operating procedures can prevent most of these mishaps. .

2.0 APPLICABILITY

This chapter is applicable to all civil servant and support service contractor (SSC) employees assigned to GRC sites, construction contractors conducting or involved in HazOps. Requirements for protecting personnel and property during hazardous test operations are provided in Section 6.0 of this chapter.

3.0 BACKGROUND

Hazardous Operations must be assessed and properly controlled to protect the workforce, public, equipment, and facilities. Therefore, in order to comply with the requirement of NPR 8715.3C, SHeD has developed the following guidelines for current and future HazOps conducted at Lewis Field or Plum Brook Station.

4.0 POLICY

It is GRC's policy to comply with all applicable regulations regarding HazOps to prevent illness and injury of workers and damage to the environment, equipment, and facilities. To accomplish this, all personnel must comply with the requirements of this chapter.

Personnel who perform or control HazOps must be trained and certified with the necessary knowledge, skill, judgment, and physical ability (if specified in the job classification) to do the job safely.

It is also GRC's policy to ensure personnel obtain HazOps safety certification for those tasks that potentially have an immediate danger to the individual (death or injury to self) if not done correctly, could create a danger to other individuals in the immediate area (death or injury) or to the environment.

5.0 RESPONSIBILITIES

5.1 Safety and Health Division (SHeD)

The following are the responsibilities of SHeD:

- Provides guidance on evaluating HazOps and assist those, as needed, with obtaining an HOP when required.
- Reviews all HOPs
- Maintains an "approval" process for all HOPs
- Receives concurrence for the Authority Having Jurisdiction for HOPs that concern fire protection and life safety issues
- Ensures specific personnel certification requirements are established in cases where HazOps depend upon adherence to specific standards, guidelines, and training
- Recommends procedures to reduce the risk and minimize potential hazard exposures

- Verifies required training beyond that provided under the Hazard Communication Standard

5.2 Project Managers and Researchers

Project managers and researchers are responsible for

- Identifying HazOps in their areas and operations and following the requirements established to control hazards
- Contacting a SHeD industrial hygienist or safety engineer or both, as appropriate, to assist with determining what operations are considered HazOps
- Ensuring that all HazOps have been reviewed by fire protection and/or safety professionals
- Ensuring all HazOps are reviewed by SHeD and the contractor's safety and health representative has approved the procedure.
- Ensuring deviations or changes to the HOPs are documented and reviewed.
- Ensuring facility operating instructions and changes are developed based on the facility mission and operational requirements
- Ensuring all procedures include sufficient detail to identify residual hazards and cautions to NASA personnel
- Ensure HOPs title pages are marked conspicuously with "THIS DOCUMENT CONTAINS HAZARDOUS OPERATIONS PROCEDURES" to alert operators that strict adherence to the procedural steps and safety and health precautions are required to ensure the safety and health of personnel and equipment
- Ensure personnel other than certified operators are excluded from exposure to HazOps that depend upon adherence to specific standards, guidelines, and training
- Ensure the buddy system is used whereby an adjacent or nearby person not directly exposed to the hazard serves as an observer to render assistance where the risk of injury is high
- Ensure all HOPs, except for construction related activities, are governed by an approved safety permit.

5.3 Supervisors

Supervisors are responsible for the following:

- Identifying the HazOps and HOPs in their areas
- Complying with the requirements and/or conditions set forth in applicable HOPs or other procedures established to control hazard
- Conducting job hazard analyses, when appropriate, to ensure personnel have the proper personal protective equipment for HazOps
- Ensuring regulated areas are properly marked and access restricted
- Ensuring that employees performing HazOps are certified with the necessary knowledge, skill, judgment, and physical ability
- Managing the certification program for their employees and contractors in accordance with the requirements of this chapter
- Ensuring employees follow good work practices
- Ensuring employees meet training requirements and have knowledge of the hazards
- If industry-recognized training is not available, such as wind tunnel operator, developing a certification program to meet the requirements specified within Section 6.1
- Providing a list of employees that require HazOps certification

- Managing employee certifications with System for Administration, Training, and Educational Resources for NASA (SATERN)

5.4 Authority Having Jurisdiction

The Authority Having Jurisdiction for Fire Protection and Life Safety must

- Review HOPs that have identified fire protection or life safety risks.

5.5 Employees

Employees are responsible for the following:

- Becoming familiar with HazOps in their work area
- Complying with the requirements and/or conditions set forth in applicable HOPs and with other requirements for controlling hazards
- Notifying supervisors of any uncontrolled hazards in their work areas
- Using personal protective equipment as specified in established work procedures (i.e., JHAs, safety permits, HOPs, Standard Operating Procedures (SOPs), etc.)
- Notifying their supervisors of any operational changes that would present new hazards
- Becoming certified to perform HazOps activities requiring certification (i.e., high-voltage work, critical lifts, wind tunnel operation, etc.)
- Attending required training

5.6 Medical Director, Occupational Medicine Services

Medical Services is responsible for

- Ensuring that physical and medical examinations to support certification requirements are in compliance with OSHA and other Federal, State, and local agency applicable codes, regulations, and standards
- Maintaining complete, accurate records of all physical and medical examinations for personnel in the certification program. Records are to be retained for at least 30 years. Results of examinations are to be discussed with employees as needed.

  NOTE: *The need for fitness-for-duty examinations should be based upon the hazardous consequences of the employee's inability to perform the job correctly due to physical or mental deficiencies. The certifying authority will determine if a medical examination is required.*

5.7 Human Capital Development Branch Chief

The Human Capital Development office is responsible for

- Scheduling employee training
- Maintaining records for employees who completed NASA-sponsored training and any associated examinations.

6.0 REQUIREMENTS

SHeD must review HazOps at the Center. Hazardous Operations Procedure is required to address the hazards. The process must be appropriately controlled to prevent loss of life, serious injury or illness to personnel, or damage to systems, equipment, facilities, or the environment.

6.0 Verification: SHeD will review all HOPs meeting the definition in paragraph 6.1 and provide written concurrence that the HOP meets all of the requirements in this chapter.

Determining Hazardous *Operations (The GRC shall follow the requirements of NASA NPR 8715.3C, Section 3.8).* HazOps are any operations that involve materials or equipment that, if misused or mishandled, have a high potential to result in the following: Loss of life, Serious Injury or Illness to Personnel, or Significant Damage to Systems, Equipment, or Facilities

A hazardous operations procedure (HOP) is generally required in the following situations:

- Whenever engineering controls are either not feasible or have been shown to be inadequate to control a significant hazard to personnel or equipment.
- Whenever significant facility damage has occurred previously, but resulted in no personnel injury or loss of life, and that facility damage could have been prevented by following a detailed step-by-step procedure.
- Where personnel may be directly exposed to a significant hazard (thermal, mechanical, electrical, chemical, radiation, high or low pressure) that cannot be controlled by any other means.

NOTE: Before attempting to develop a HOP, a discussion between SHeD and the responsible organization is required to evaluate the necessity for the HOP and to investigate possible alternatives before proceeding.

6.1 Hazardous Operations Certification (*NASA NPR 8715.3, Section 3.8*)

The following are to be incorporated into the HazOps certification and documented, when required:

- Physical exam Initial training (online, classroom, and on-the-job)
- Written exam with passing score (70 percent or greater)
- Periodic refresher including emergency response procedures
- A recertification period (not to exceed 4 years)
- Applicable requirements related to federal regulations

6.1 Verification: Personnel who are hazardous operations certified or hazardous material handler certified are identified through the issuance of a card, license, badge or a listing on a personnel certification roster or database by their employer. Personnel certification rosters indicate the name, date, materials or operations for which certification is valid, name of certifying official, and date of expiration.

6.2 Hazardous Operations Permit or Hazardous Operations Procedure (*NASA NPR 8715.3C, Section 3.8.2*)

All HazOps must be assessed and analyzed to ensure that if they require an HOP, that the document contains the following information:

- Detailed procedure with step-by-step functions or tasks performed on the system or equipment to ensure safe and efficient operations
- Clear identification within the procedure when the HazOp begins and when it ends.
- Any special precautions, such as personal protective equipment, required to maintain a safe operation
- Start and stop times of the operation
- Approving supervisor

All HOP title pages shall be marked conspicuously with “THIS DOCUMENT CONTAINS HAZARDOUS OPERATIONS PROCEDURES” to alert operators that strict adherence to the procedural steps and safety and health

precautions contained within the procedure are required to ensure the safety and health of personnel and equipment. A template for preparing a HOP is shown in Appendix B.

6.3 Medical Surveillance (*29 CFR 1910* and *NASA NPR 1800.1*)

Individuals requiring medical certification to perform HazOps must have the appropriate physical examination according to the NASA NPR 1800.1C, Appendix C, requirements.

Individuals requiring such exams must contact Occupational Medicine Services to receive directions on scheduling the examination. The content of the exam is dictated by NASA and provided in 0. For those using another medical provider, they must contact the SHeD industrial hygienist who will coordinate with Medical Services to provide minimum exam content requirements to that medical provider.

7.0 RECORDS

Original Safety Permit Documentation—Maintained by Safety Committee Chair. Original Safety Permit documentation including the approved Safety Permit(NASA GRC919), New Safety Permit Request (NASA GRC923), Safety Permit Renewal Change Request (NASA GRC590), Qualified Operators List (NASA GRC580), Safety Permit Hazard Analysis Worksheet (NASA GRC923a), or facility hazard analysis (FHA) and all related drawings, specifications, procedures, and checklists including written correspondence with the permit requester.

Copies of Safety Permit Documentation—Maintained by SHeD. Copies of Safety Permit documentation including the approved Safety Permit (NASA GRC919), New Safety Permit Request (NASA GRC923), Safety Permit Renewal Change Request (NASA GRC590), Qualified Operators List (NASA GRC580), and all cancelled or archived safety permits.

HazOps Certifications—Original maintained by supervisors within SATERN

Job Hazard Analysis—Copy of original maintained by Requester and Supervisor

Hazard Assessment—Maintained by Requester and Supervisor

Exposure Assessment—Original Maintained by SHeD

Medical Examinations—Original maintained by Medical Services

Chemical Inventory—Original maintained by SHeD

8.0 REFERENCES

Document number	Document name
NPR 8715.3.C (3.8 and 7.4)	NASA General Safety Program Requirements (7/20/09)
GLM–QSA–1700.1	NASA Glenn Safety Manual, Chapter 33—Job Hazard Analysis
NPR 1800.1	NASA Procedural Requirement

APPENDIX A.—DEFINITIONS AND ACRONYMS

Authority Having Jurisdiction (AHJ) **-** The appointed individual at GRC responsible for implementation of the Center's Fire and Life Safety Program.

Engineering controls.—Designing out a hazard at its source by process changes, substitution of less harmful materials, isolation, ventilation, and source modification. Physical controls implemented at the design, installation, or engineering stages (e.g. guards, auto shutoff, etc.).

Facility Hazard Analysis (FHA)- A systematic approach to hazard identification where each system, sub-system, or component is evaluated using a "What If" analysis, a hazard and operability analysis or failure mode effects analysis. A risk index is assigned to each hazard typically before controls are applied and after controls are applied.

Hazardous Operations Procedures (HOP).—A document that shall contain all of the necessary steps needed to control a serious hazard.

Hazardous Operations (HazOps).—Any operation that involves materials or equipment that, if misused or mishandled, has a high potential to result in the following: (1) loss of life, (2) serious injury or illness to personnel, and (3) damage to systems, equipment, or facilities.

Safety and Health Division (SHeD)

Support Service Contractor (SSC)

System for Administration, Training, and Educational Resources for NASA (SATERN)

APPENDIX B— HAZARDOUS OPERATIONS PROCEDURES (HOP) SAMPLE FORMAT

1. Title Page
   - Name of process or procedure
   - Location of procedure: facility or building and room number
   - Revision status and approval date in the upper right hand corner
   - Text box centered in the middle of the title page stating: The following contains Hazardous Operations Procedures. The text box shall have a bright red background and white lettering.
2. Document signature page of required signatures of supervisor
3. Document revision page
4. Description of the hazard and consequences of noncompliance
5. HOP "step-by-step" procedure or checklist
   - The procedure or checklist must begin with a text box centered in the center of the page with wording indicating: "The following steps contain hazardous operations-strict adherence is required" at the beginning of the HOP. The text box will have a bright red background and have white or high contrast lettering that is easy to read.
   - The procedure or detailed checklist must indicate the date and operator's name
   - Each step will be marked with a checkbox or underscore at the beginning of each step for the operator to check off
   - The procedure must end with a text box centered in the page with the wording indicating: "This is the end of the Hazardous Operations Procedure". The text box must have a green background and white or high contract lettering that is easy to read.
   - The procedure or checklist must have a start and stop time.